ONTARIO MINISTRY OF ENVIRONMENT
3693600024262

OPERATING SUMMARY

RICHMOND HILL

water pollution control plant

1968

BORATORY LIBRARY
ATER RESOURCES COMMISSION
BRARY COPY
AUG 20 1969
ONTARIO WATER
SOURCES COMMISSION

TD
367
.A56
R53
1968
MOE

ONTARIO WATER RESOURCES COMMISSION
Division of Plant Operations

TD
367
.A56
R53
1968

Richmond Hill : water pollution control plant.

81841

Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 7
Ontario

We are pleased to present you with the Operating Summary for the water pollution control facilities operated for you during 1968.

Both the financial and technical information presented should be of assistance to your present and future planning in this important phase of municipal activity.

A new format has been devised to allow greater readability with equally detailed content. We trust that this will meet with your approval.

Our staff wish to express their appreciation for your co-operation throughout the year.

D. S. Caverly,
General Manager.

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

LIBRARY COPY

AUG 20 1969

ONTARIO WATER
RESOURCES COMMISSION

Digitized by the Internet Archive
in 2015

https://archive.org/details/richmondhillwate24262

ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN
Dr. James A. Vance

VICE-CHAIRMAN
J. H. H. Root, M. P. P.

COMMISSIONERS
H. E. Brown
D. A. Moodie
L. E. Venchiarutti

GENERAL MANAGER
D. S. Caverly

ASSISTANT GENERAL MANAGERS
L. E. Owers
K. H. Sharpe
F. A. Voege
A. K. Watt

COMMISSION SECRETARY
W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

Director
D. A. McTavish

Assistant Director
C. W. Perry

Regional Supervisor
P. J. Osmond

Operations Engineer
R. Kauppinen

135 St. Clair Avenue West
Toronto 7

RICHMOND HILL

water pollution control plant

operated for

THE TOWN OF RICHMOND HILL

by the

ONTARIO WATER RESOURCES COMMISSION

1968 ANNUAL OPERATING SUMMARY

FOREWORD

● This operating summary outlines the project's technical capabilities and financial status in 1968. Such information mirrors past and present performance, but a major intention is to anticipate the future -- to solve problems before they occur.

The new format in which this year's data are presented is designed to offer a higher level of readability than in the past, without a corresponding decrease in compactness, accuracy and detail.

Although your Regional Operations Engineer carries the major responsibility for the contents of the report, those involved in its preparation are attached to several Commission sections and divisions. The statistics section of the Division of Plant Operations compiled the information for the graphs and charts. The draughting section of the Division of Sanitary Engineering drew the graphs. The Division of Finance provided all cost data.

Only the close co-operation of these departments allowed the publication of this summary.

CONTENTS

Title Page i

Foreword ii

'68 Review 1

Project Costs 2

Operating Costs 3

Process Data 5

Conclusions . . . . . Inside back cover

'68 REVIEW

The cost of operating the Richmond Hill Water Pollution Control Plant in 1968 was $53,637, compared to $56,375 in 1967. The cost of treatment was $76.09 per million gallons, compared to $84.39 in 1967.

Payroll costs were about $3,000 less than the budgeted amount. Two operators were dismissed and replaced, and the chief operator was transferred. This caused under-staffing for part of the year.

In 1968, the plant treated an average flow of 1.93 mgd, 121 percent of the design capacity of 1.60 mgd. The design flow was exceeded 95 percent of the time during the year.

Reductions of 84 percent in BOD and 93 percent in suspended solids compared to 89.6 percent and 94.2 percent in 1967. The average BOD and suspended solids concentrations in the final effluent were within the OWRC objectives for secondary treatment plants 15 and 30 percent of the time respectively.

PROJECT COSTS

NET CAPITAL COST (Final) Long Term Debt to OWRC	$359,420.34
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	$ 95,931.53
Net Operating	$ 53,637.43
Debt Retirement	7,253.00
Reserve	2,053.89
Interest Charged	20,179.09
TOTAL	$ 83,123.41

RESERVE ACCOUNT

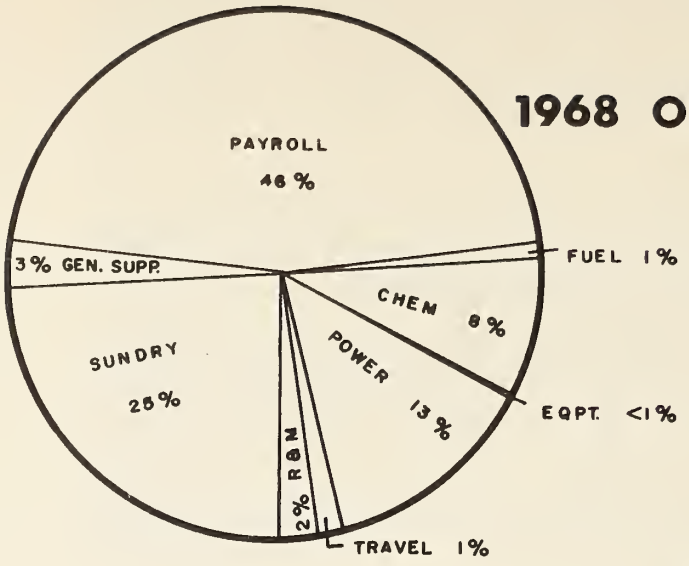
Balance at January 1, 1968	$ 18,659.99
Deposited by Municipality	2,053.89
Interest Earned	998.88
	$ 21,712.76
Less Expenditures	5,000.00
Balance at December 31, 1968	$ 16,712.76

Monthly Operating Costs

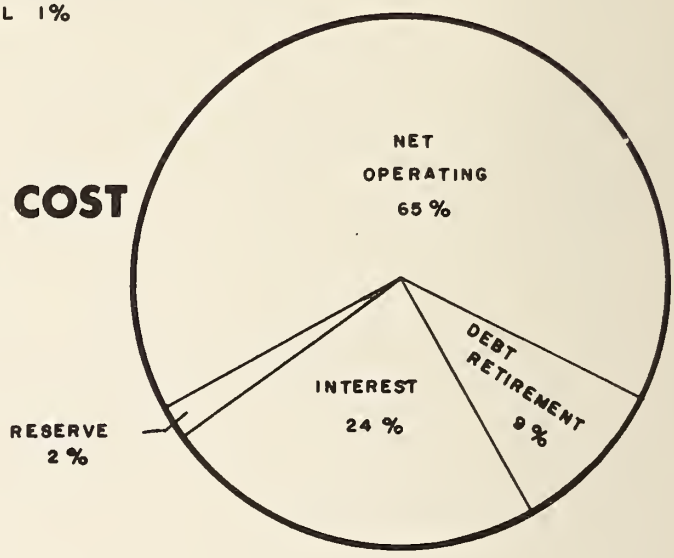
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAY ROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER	TRAVEL
JAN	2675.12	1884.69	-	-	612.35	-	138.83	-	13.05	26.20	-	
FEB	4100.25	2063.40	-	102.29	627.21	238.61	109.74	-	42.28	891.94	-	24.78
MAR	4736.01	2288.40	-	93.49	613.27	238.61	129.70	-	109.80	1199.01	-	63.73
APRIL	3541.69	1443.50	-	71.29	626.65	238.61	6.00	-	139.05	1016.59	-	
MAY	4170.63	1435.44	312.40	57.59	409.00	477.22	105.69	-	77.25	1265.80	-	30.24
JUNE	3916.30	1451.56	350.06	52.65	502.37	238.61	130.89	71.55	160.58	923.31	-	34.72
JULY	4178.33	1192.68	355.58	35.11	527.05	715.84	48.10	-	-	1274.99	-	28.98
AUG	4849.83	2358.19	411.34	27.41	581.27	-	267.84	-	88.50	1101.00	-	14.28
SEPT	3701.84	2257.42	-	27.06	547.29	715.85	79.91	-	18.02	24.37	-	31.92
OCT	3897.10	1680.77	-	24.88	562.86	238.61	159.77	-	34.49	1151.57	-	44.15
NOV	4958.67	1653.63	-	52.07	613.92	477.22	258.96	-	165.32	1678.65	-	58.90
DEC	8911.66	3434.31	-	57.71	608.95	715.83	439.23	102.98	326.30	3036.35	-	190.00
TOTAL	53637.43	23143.99	1429.38	601.55	6832.19	4295.01	1874.66	174.53	1174.64	13589.78	-	521.70

*SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $12,475.80

1968 OPERATING COSTS



TOTAL ANNUAL COST



Yearly Operating Costs

YEAR	M.G.TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1964	472.211	$51,049.00	$108.10	6 cents
1965	569.643	50,984.00	89.50	4 cents
1966	593.445	51,339.00	86.51	5 cents
1967	663.776	56,375.17	84.93	6 cents
1968	704.89	53,637.43	76.09	6 cents

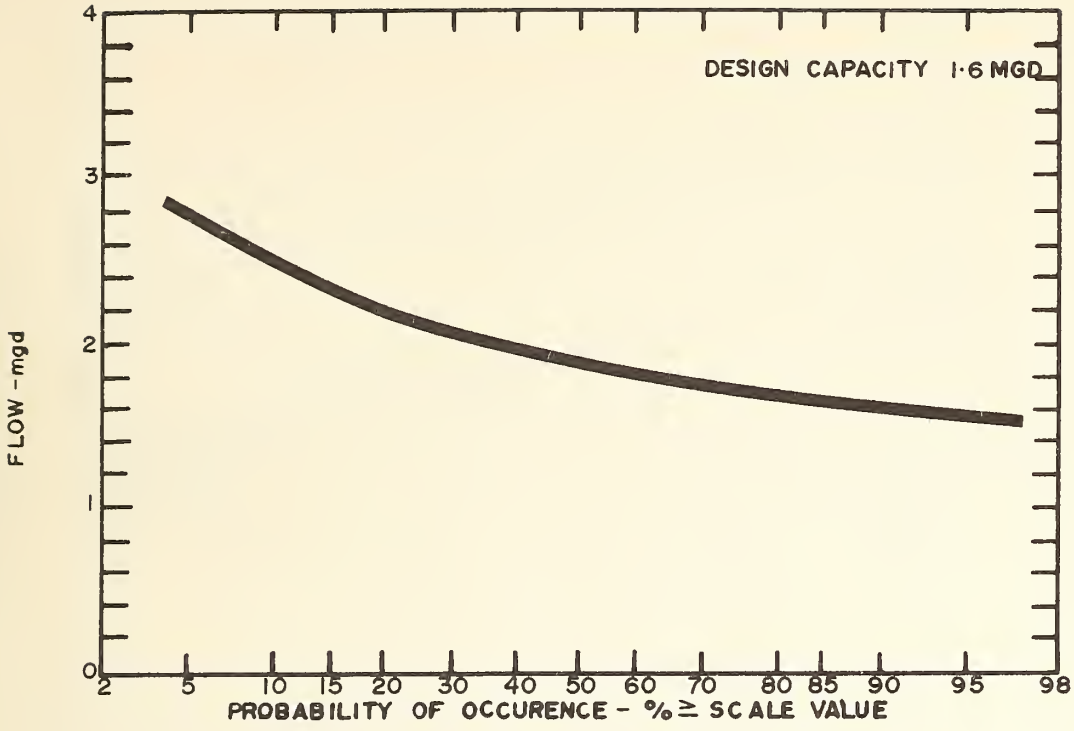
Process Data

A total of 704.89 million gallons was treated during the year. This represents an average daily flow of 1.93 million gallons which is an increase of approximately seven percent over the 1967 flows. Approximately 95 percent of the time, the design flow of 1.60 mgd was exceeded, which represents an increase of 23 percent over 1967. It should be noted that flows exceeded 3.0 mgd are bypassed and chlorinated.

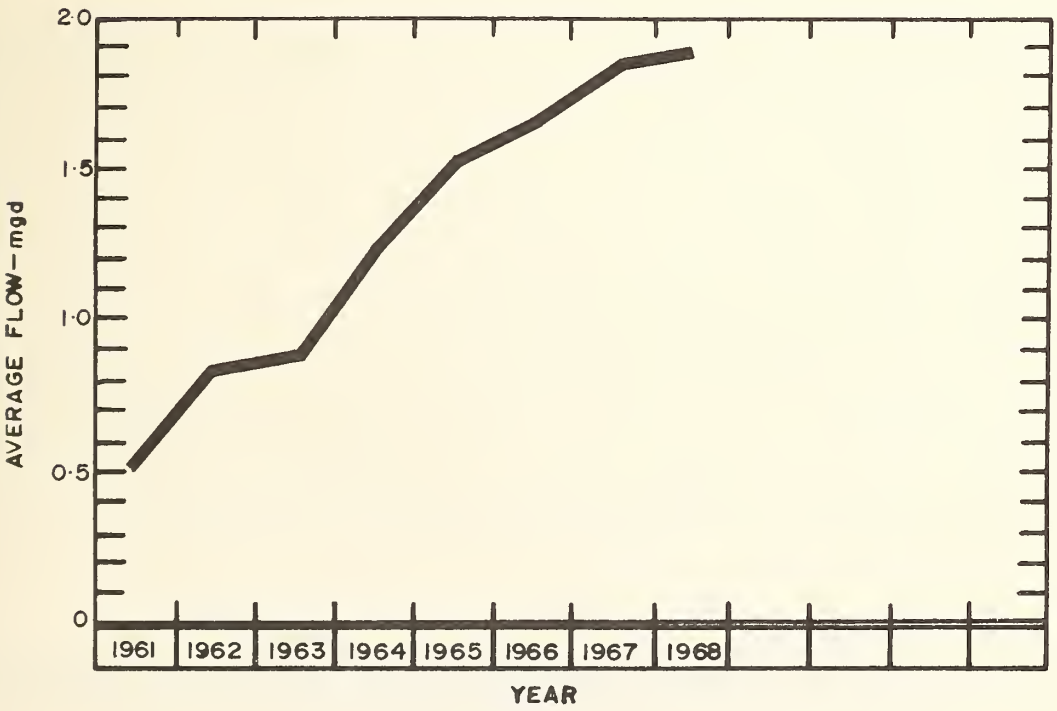
A total of 31,240 pounds of chlorine was used for an average dosage of 4.4 mg/l for the year.

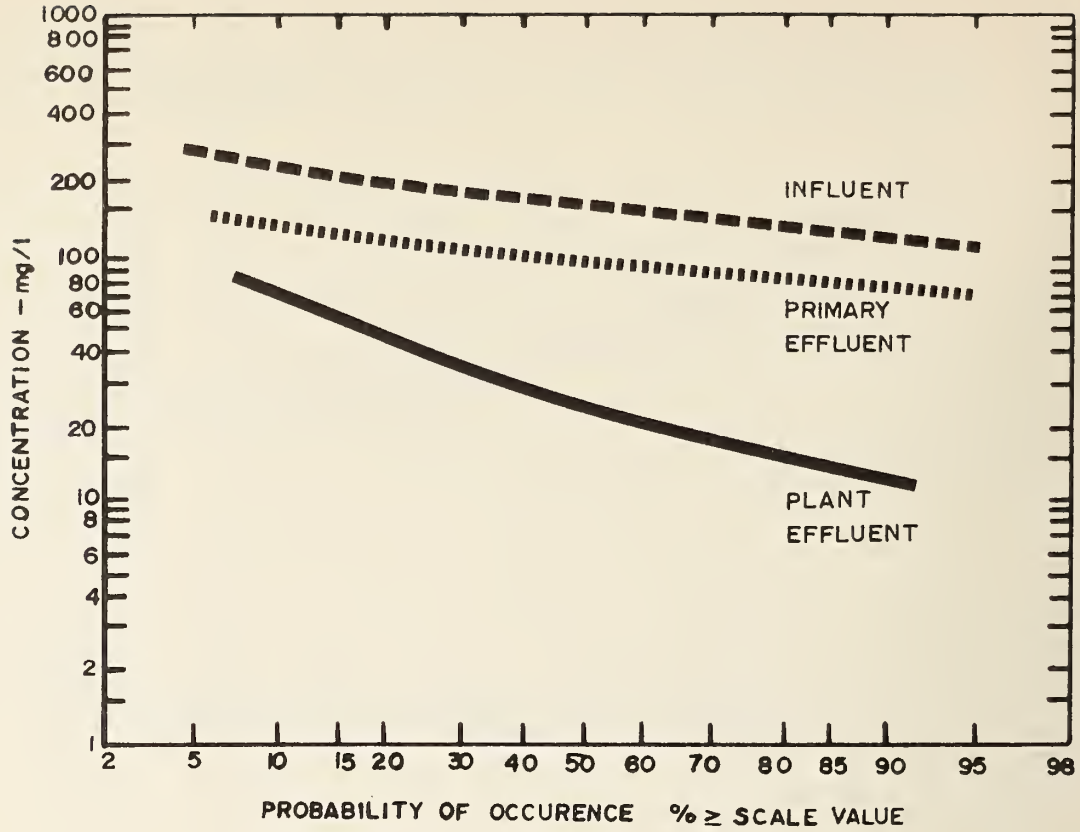
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg	CHLORINE USED 10^3 lbs.	DOSAGE mg/l
JAN	46.29	1.49	2.64	1.38	2.42	5.2
FEB	58.80	2.03	2.95	1.39	2.10	4.1
MAR	76.41	2.46	2.97	1.39	2.71	3.5
APR	50.43	1.68	2.65	1.04	2.37	4.7
MAY	68.08	2.20	2.71	1.52	2.72	4.0
JUN	59.45	1.98	2.60	1.65	2.44	4.1
JUL	54.71	1.76	2.24	1.43	2.92	5.3
AUG	53.86	1.74	2.25	1.44	2.38	4.4
SEPT	58.45	1.95	2.58	1.54	2.48	4.2
OCT	56.74	1.83	2.22	1.53	2.77	4.9
NOV	59.89	2.00	2.79	1.64	2.88	4.8
DEC	61.78	1.99	2.92	1.54	3.05	4.9
TOTAL	704.89	-	-	-	31.24	-
AVERAGE	-	1.93	-	-	2.60	4.4

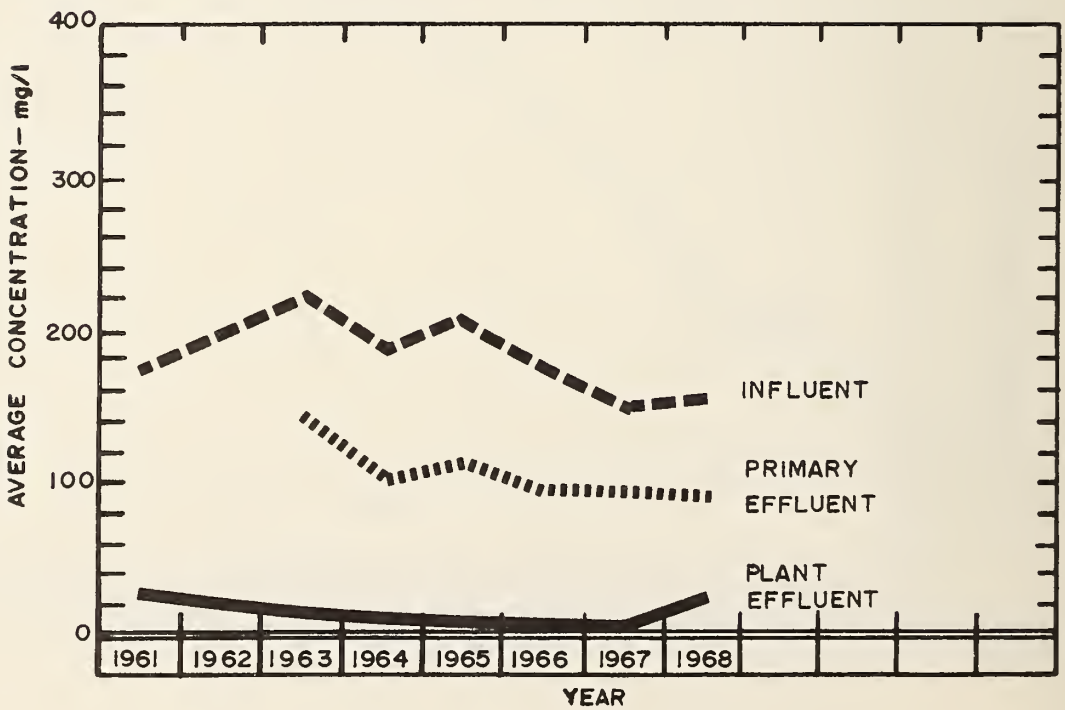

DESIGN CAPACITY 1·6 MGD
FLOW - mgd
0
1
2
3
4
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PROBABILITY OF OCCURENCE - % ≥ SCALE VALUE

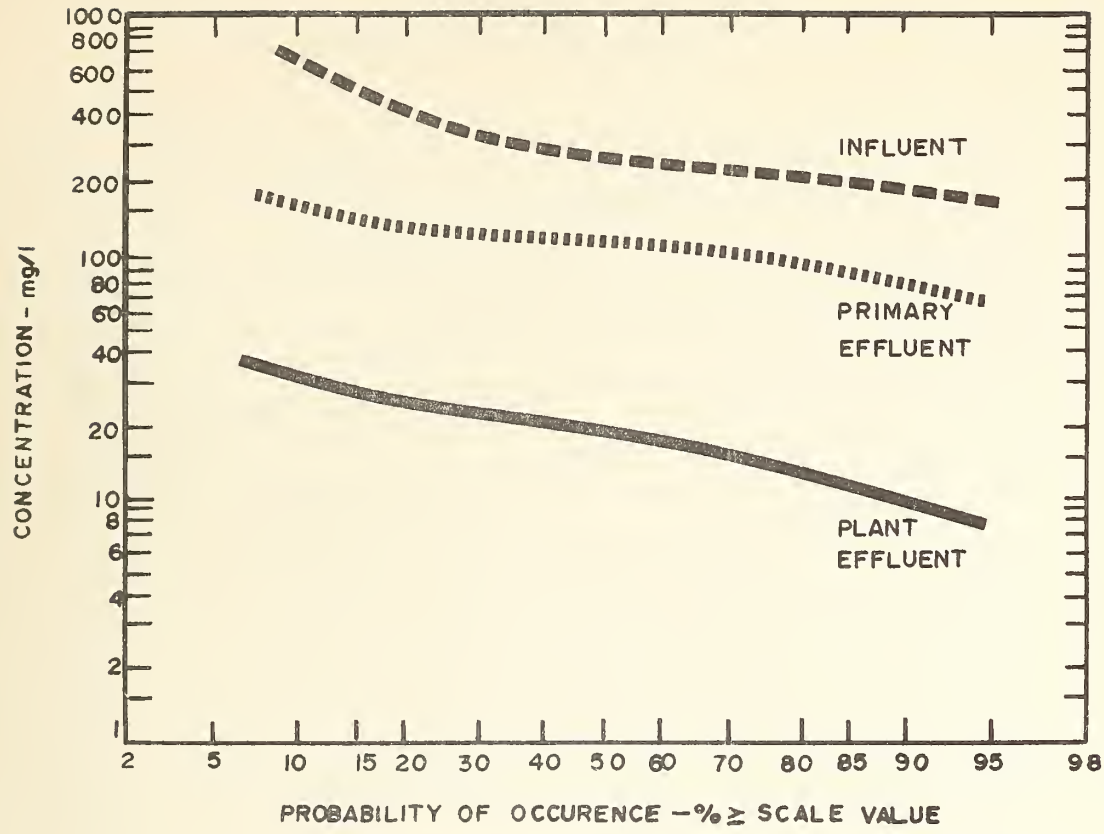
FLOWS


AVERAGE FLOW - mgd
0
0·5
1·0
1·5
2·0
1961
1962
1963
1964
1965
1966
1967
1968
YEAR

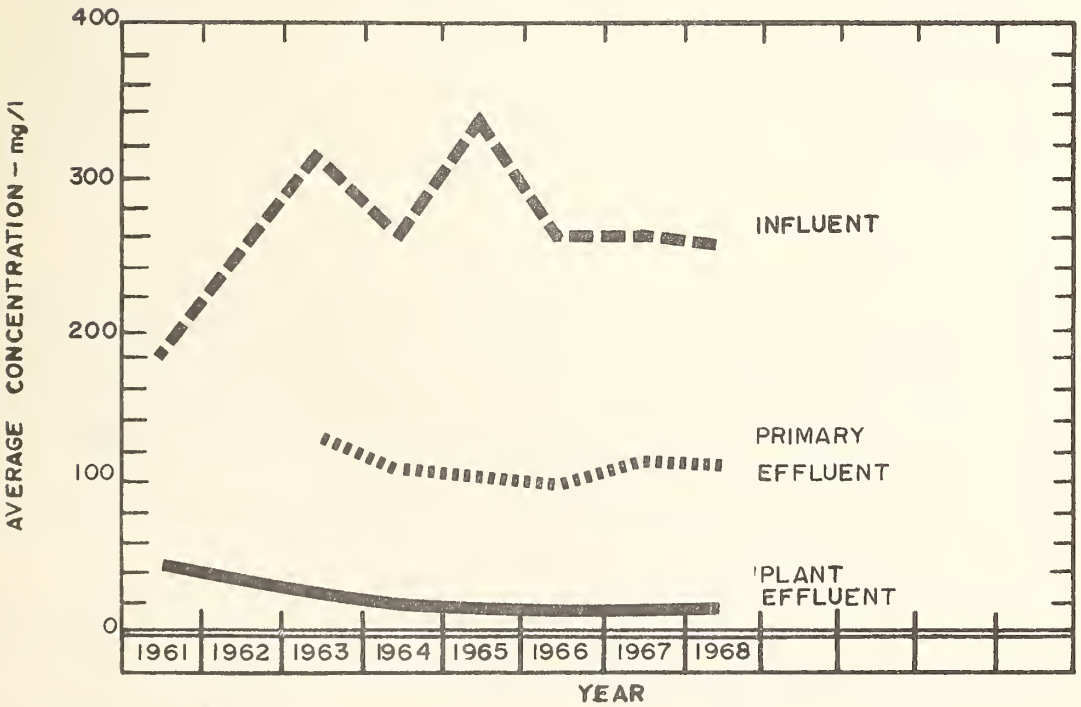


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT
	INF CONC^N mg/l	EFF CONC^N mg/l	RED^N %	REMOVAL 10^4 lb	INF CONC^N mg/l	EFF CONC^N mg/l	RED^N %	REMOVAL 10^4 lb	REMOVAL ft^3
JAN	270	18	93	11.67	576	31	95	25.23	132
FEB	185	70	62	6.76	298	20	93	16.35	111
MAR	135	36	73	7.57	112	24	79	6.73	118
APR	118	21	82	4.89	181	14	82	8.42	102
MAY	140	14	90	8.58	246	8	97	16.20	127
JUN	140	8	95	7.87	164	5	97	9.45	121
JULY	84	6	92	4.27	134	10	92	6.78	188
AUG	170	59	60	5.98	227	25	89	10.88	145
SEPT	160	16	90	8.42	172	14	92	9.24	151
OCT	165	13	92	8.63	214	11	95	11.52	129
NOV	125	23	82	6.11	173	15	91	9.46	115
DEC	200	25	88	10.81	530	20	96	31.51	92
TOTAL	-	-	-	91.56	-	-	-	161.	1531
AVERAGE	158	26	84	7.63	252	17	93	13.48	128

COMMENTS

Raw sewage with average strength of 158 mg/l in BOD and 252 mg/l in suspended solids was treated in 1968. The average BOD and the average suspended solids in the final effluent were 25 mg/l and 17 mg/l respectively, both of which are above the OWRC objective of 15 mg/l. In 1967 they were 13 mg/l and 15 mg/l respectively.

The average removal efficiencies were 84 percent for BOD and 93 percent for suspended solids compared to 89.6 percent and 94.2 percent in 1967.

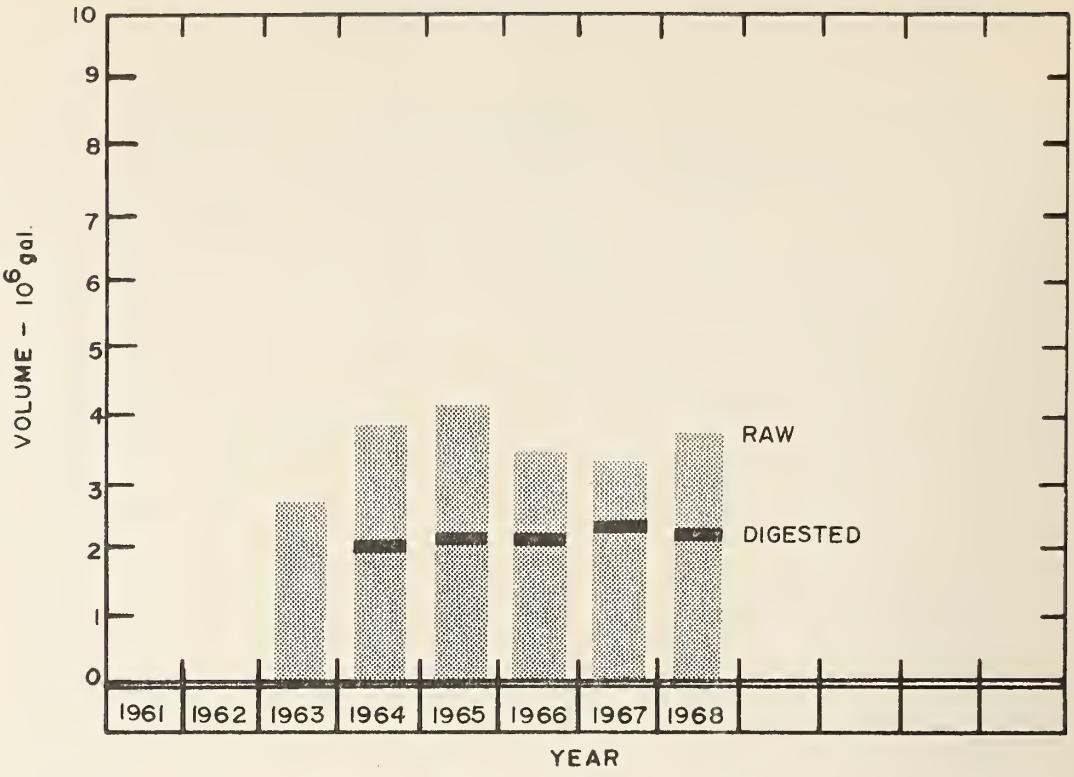
A total of 1531 cubic feet of grit was removed, for an average of 2.2 cubic feet per million gallons treated.

AERATION

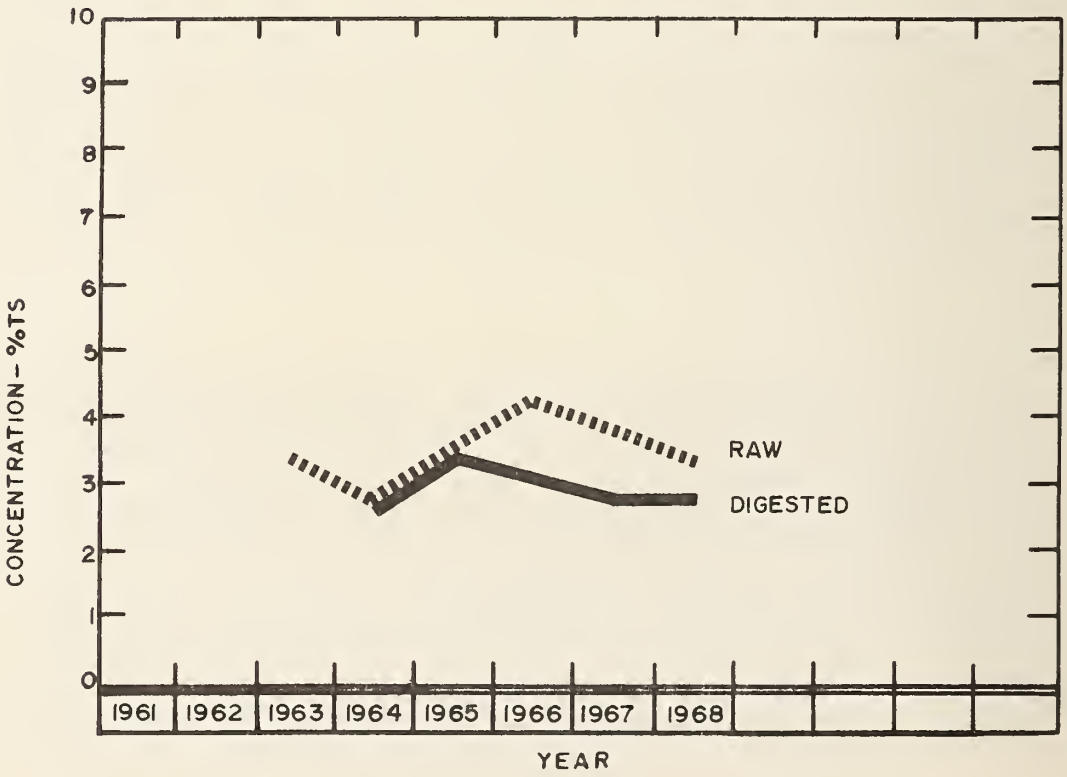
MONTH	AVERAGE FLOW mgd	PRIMARY EFF BOD CONC^N mg/l	PRIMARY EFF SS CONC^N mg/l	SECONDARY EFF BOD CONC^N mg/l	SECONDARY EFF SS CONC^N mg/l	MLSS CONC^N mg/l	F/M (lb BOD / lb MLSS)	AIR USED (1000 ft / lb BOD REMOVED)	WASTE SLUDGE lb
JAN	1.49	90	105	18	31	940	.36	2.86	-
FEB	2.03	132	190	70	20	1,040	.64	1.19	-
MAR	2.46	92	67	36	24	980	.57	1.93	-
APRIL	1.68	53	82	21	14	1,370	.16	4.96	-
MAY	2.20	74	126	14	8	1,160	.35	2.03	-
JUN	198	90	111	8	5	880	.50	1.68	-
JUL	1.76	98	78	6	10	1,610	.26	1.62	-
AUG	1.74	110	113	59	25	500	.96	3.02	-
SEPT	1.95	72	48	16	14	700	.49	3.12	-
OCT	1.83	76	82	13	11	760	.45	2.95	-
NOV	2.00	105	115	23	15	790	.66	2.05	-
DEC	1.99	110	110	25	20	820	.66	1.84	-
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	1.93	92	102	26	17	963	.51	2.44	-

COMMENTS

The average primary effluent had a concentration of 93 mg/l in BOD and 102 mg/l in suspended solids. The aeration section mixed liquor suspended solids had an average concentration of 963 mg/l. The average loading on the aeration section was 51 pounds of BOD per 100 pounds of MLSS or a food-to-micro-organism ratio of 0.51. An average of 2,440 cubic feet of air was used per pound of BOD removed.


VOLUME - 10^6 gal.
10
9
8
7
6
5
4
3
2
1
0
RAW
DIGESTED
1961
1962
1963
1964
1965
1966
1967
1968
YEAR

DIGESTION


CONCENTRATION - %TS
10
9
8
7
6
5
4
3
2
1
0
RAW
DIGESTED
1961
1962
1963
1964
1965
1966
1967
1968
YEAR

SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10^5 gal	T. S. %	V.S. %	VOLUME 10^5 gal	T. S. %	V.S. %	VOLUME gal	T. S. %	LIQUID yd^3	DEWATERED yd^3
JAN	3.19	3.8	74	2.10	3.3	41	-	-	1248	0
FEB	2.74	1.5	72	2.10	1.8	67	-	-	1248	0
MAR	3.12	1.8	72	1.92	2.4	66	-	-	1140	0
APR	2.93	-	-	2.30	-	-	-	-	1368	0
MAY	3.32	7.7	85	1.74	6.6	54	-	-	1032	0
JUN	2.78	-	-	2.18	-	-	-	-	1296	0
JUL	3.64	-	-	2.18	-	-	-	-	1236	0
AUG	3.05	2.2	75	2.18	2.5	57	-	-	1296	0
SEPT	2.62	4.2	74	2.14	1.9	61	-	-	1272	0
OCT	3.32	4.4	72	2.04	1.3	-	-	-	1212	0
NOV	3.90	1.3	-	1.11	3.4	-	-	-	1056	0
DEC	3.40	-	-	1.54	-	-	-	-	1032	0
TOTAL	38.01	-	-	23.53	-	-	-	-	14436	0
AVERAGE	3.17	3.4	75	1.96	2.9	58	-	-	1203	0

COMMENTS

A total of 3.801 million gallons of raw sludge was pumped to the digester at a solids concentration of 3.4 percent of which 75 percent was volatile matter. A total of 2.353 million gallons of digested sludge was removed at a solids concentration of 2.9 percent of which 58 percent was volatile matter. Sludge disposal was by tank truck haulage.

The volatile reduction was approximately 55 to 60 percent during the year, which is indicative of a good digester operation.

CONCLUSIONS

The average hydraulic and organic loads are at approximately the design capabilities of the plant and exceed them a good percentage of the time. There has been a decrease in the quality of the final effluent compared to 1967. The average concentration of BOD and suspended solids in the final effluent for the year no longer falls within the OWRC objectives of 15 mg/l for secondary treatment plants.

There is now a proposal to increase the treatment facilities at the treatment plant.

Water management in Ontario